

October 9, 2020

Ms. Nancy Rumrill
U.S. Environmental Protection Agency, Region 9
Drinking Water Protection Services, WTR-4-2
75 Hawthorne Street
San Francisco, California 94105

Re: Transmittal of Supplemental Information in Support of Application for Underground Injection Control Permit, Florence Copper Project, Florence, Arizona

Dear Ms. Rumrill:

Pursuant to our telephone conversations on October 1 and 8, 2020, Florence Copper Inc. (Florence Copper) herewith transmits supplemental information in support of our application for an Underground Injection Control (UIC) Permit submitted to the U.S. Environmental Protection Agency (USEPA) on October 4, 2019 (Application). The information transmitted herewith reflects our understanding of and response to questions the USEPA has regarding previously submitted Application materials.

Each of the sections below begins with our stated understanding of the additional information requested by the USEPA, followed by our response, which includes references to the attached materials.

Request 1:

The USEPA requested that Florence Copper provide a wellfield map showing the configuration of perimeter, observation, and Point of Compliance (POC) wells for the purpose of demonstrating hydraulic control during a period of time when both rinsing and active ISCR operations are ongoing.

Response 1:

Florence Copper has prepared Figure A-20 which depicts the typical hydraulic control configuration that will be employed during periods of time when rinsing and active In-Situ Copper Recovery (ISCR) operations are ongoing simultaneously.

As described in our response dated September 14, 2020, the active ISCR wellfield is defined as the area where injection, recovery, observation, and perimeter wells have been installed and are in use for injection, recovery, rinsing, or water level observation. ISCR wells that are undergoing rinsing remain subject to the requirement of hydraulic control.

During the life of the facility, there will be periods of time when rinsing is ongoing in areas that are proximal to active copper recovery operations. In these instances, Florence Copper will continue to maintain hydraulic control at the perimeter of the active ISCR wellfield, including both the areas undergoing active copper recovery and rinsing.

The buffer zones between rinsing areas and active copper recovery areas will ensure that both processes continue without mutual interference. This strategy includes the use of one or more rows of resting wells, and/or injection of fresh water between the active copper recovery areas and the rinsing area. All of the wells actively undergoing active copper recovery, rinsing, and resting will be located within the hydraulic control perimeter.

Figure A-20 shows the hydraulic control configuration during a typical rinsing period. This period of wellfield operations includes active rinsing wells and active ISCR operations in other areas of the wellfield. As shown on the Figure, the rinsing area and the active ISCR area both exist within the hydraulic control perimeter and are separated by two rows of wells that are resting or being used for freshwater injection.

As rinsing is completed and the rinsed ISCR wells are prepared for closure, the hydraulic control perimeter will advance to the edge of the active rinsing area. Florence Copper will maintain hydraulic control of the active ISCR wellfield which includes wells in use for injection, recovery, and rinsing until the rinsed wells are approved for closure.

Request 2:

The USEPA requested Florence Copper provide an explanation of the differences between Tables P-3 and P-4 of UIC Permit R9UIC-AZ3-FY11-1 and Tables 13 and 14 of draft APP No. P-101704.

Response 2:

Tables 13 and 14 of the draft Aquifer Protection Permit (APP) No. P-101704 were submitted to the USEPA with our response dated September 14, 2020 to provide information regarding planned quarterly and annual groundwater monitoring. Tables P-3 and P-4 of UIC permit R9UIC-AZ3-FY11-1 describe quarterly and semi-annual groundwater monitoring requirements for the pilot scale Production Test Facility (PTF).

Florence Copper compared the analytes listed in Table P-3 of UIC permit R9UIC-AZ3-FY11-1 (named Quarterly Compliance Monitoring [Level 1 Parameters]), and Table 13 of the draft APP No. P-101704 (named Quarterly Groundwater Compliance Monitoring). The analytes listed in each of these tables were found to be the same, with the exception that the UIC permit did not require water level elevation or depth to groundwater to be reported.

Florence Copper compared the analytes listed in Table P-4 of UIC permit R9UIC-AZ3-FY11-1 (named Semiannual and Contingency Monitoring [Level 2 Parameters]), to the parameters listed in Table 13 (named Quarterly Groundwater Compliance Monitoring) and Table 14 of the draft APP No. P-101704 (named Annual Groundwater Monitoring). Note that for annual monitoring events, Florence Copper will monitor Table 13 parameters and Table 14 parameters. The analytes listed in the two sets of tables were found to be the same, with the exception that the UIC permit did not require water level elevation or depth to groundwater to be reported. The only other difference between these tables is the required frequency of monitoring for these analytes for the PTF and the commercial scale ISCR facility.

The PTF is a pilot scale ISCR demonstration facility that has a permit limited operational period of two years. During the UIC application process for the PTF, the planned annual monitoring frequency was reduced to a semi-annual period to ensure that groundwater quality data would be collected during the operational life of the PTF. The planned commercial ISCR facility will have an operational life of more than 20 years. Consequently, an annual monitoring frequency is appropriate for the analytes listed in Table P-4 of UIC permit R9UIC-AZ3-FY11-1 and Table 14 of the draft APP No. P-101704.

The analytes and frequency of monitoring listed in Tables 13 and 14 of the draft APP reflect the planned groundwater monitoring set forth by the Arizona Department of Environmental Quality (ADEQ) for the commercial ISCR facility. The analytes listed in Tables 13 and 14 are consistent with those listed in Tables P-3 and P-4 of the PTF UIC permit. The only substantive difference between these tables is the frequency of monitoring identified for the level 2 analytes listed in Table P-4 of the UIC permit and Table 14 of the draft APP. Given the anticipated life of the facility and the comprehensive nature of the quarterly monitoring, it is appropriate that level 2 analytes listed in Table 14 of the draft APP be monitored at an annual frequency.

Request 3:

The USEPA requested Florence Copper provide an explanation of the differences between Exhibit D-7 (titled Discharge Limitations, Monitoring Requirements and Alert Levels) and Exhibit P-1 of UIC Permit R9UIC-AZ3-FY11-1 which was issued for the pilot scale PTF facility.

Response 3:

Florence Copper compared the information contained in Exhibit P-1 of UIC R9UIC-AZ3-FY11-1 and Exhibit D-7 submitted with our response to comments dated September 14, 2020. Both exhibits include information describing discharge limitations, monitoring activities, monitoring and analytical requirements, groundwater monitoring sampling protocols, existing alert levels (AL) and aquifer quality limits (AQL), new ALs and AQLs, replacement POC wells, compliance monitoring, and facility operational monitoring.

The primary differences between these documents arise from differences between the pilot scale PTF addressed by UIC R9UIC-AZ3-FY11-1, and the planned commercial scale ISCR facility, and the fact that Exhibit D-7 reflects updated ADEQ procedures for setting ALs and AQLs. The commercial ISCR facility will include 31 POC wells, of which 30 already have established ALs and AQLs. Consequently, the specific information included in Exhibit P-1 regarding establishing new ALs and AQLs at specific wells is not necessary. All of the existing ALs and AQLs are listed in Tables 13 and 14 of the draft APP No. P-101704.

The only POC well (M33-UBF replacement) that does not yet have established ALs and AQLs, has not yet been drilled. Unlike the PTF, the commercial ISCR facility does not include supplemental monitoring wells which effectively duplicated the POC wells. Otherwise, Exhibit D-7 provides information describing discharge limitations, monitoring requirements, and ALs that is equivalent to the information included in Exhibit P-1 of UIC R9UIC-AZ3-FY11-1.

During our comparison of Exhibits D-7 and P-1, Florence Copper identified a typographical error in the original version of Exhibit D-7. A corrected version of Exhibit D-7 is submitted herewith, and Florence Copper requests that the USEPA replace the original version with this corrected replacement version.

FLORENCE COPPER INC.

1575 W. Hunt Highway, Florence, Arizona 85132 USA florencecopper.com



Request 4:

The USEPA requested that Florence Copper provide hydraulic control data from operation of the PTF wellfield.

Response 4:

Daily monitoring of the hydraulic gradient at the edge of the PTF wellfield is required as part of the Best Available Demonstrated Control Technology (BADCT) monitoring detailed in Table 4.1-8 of the Temporary APP and Part II.E.1.b of the UIC permit. The purpose of this monitoring is to ensure there is a water level differential between the wellfield and the surrounding formation as a result of the 110 percent or greater over-pumping described above. Both permits require a water level differential of at least 1 foot between the observation and recovery wells at the corners of the PTF wellfield as an indication of hydraulic control.

Daily water levels measured at the PTF observation and recovery wells are plotted on Figures 1 through 8 for the period of operations spanning from December 2018 through the end of the second quarter of 2020. Data for quarter 3 of 2020 are currently being compiled and are not yet available for review. Figure 9 shows the relative locations of the wells for which water levels are plotted on Figures 1 through 8. The water level data plotted on Figures 1 through 8 indicate groundwater elevations at the perimeter of the PTF wellfield were consistently higher than groundwater elevation within the wellfield, confirming the over-pumping sustained hydraulic control effectively and maintained an inward gradient during PTF operations. These data also show that Florence Copper has maintained the daily average minimum 1-foot inward hydraulic gradient between paired observation and recovery wells since the commencement of PTF operations on December 15, 2018.

The groundwater elevation comparison required by the Temporary APP and Part II.E.1.b of the UIC permit uses recovery and observation wells at the corners of the PTF wellfield in relatively close proximity to one another on adjacent sides of the wellfield. Because the observation wells were constructed at the edge of the PTF wellfield using the same spacing as the injection and recovery wells, each observation well experiences drawdown from two recovery wells. This configuration effectively means that Florence Copper must demonstrate inward groundwater flow from two directions in a relatively small area (a 71-foot distance in two directions), and that the 1-foot differential demonstration is dependent on the hydraulic conductivity of the oxide zone between the recovery and observation wells.

Because the hydraulic conductivity of the oxide zone is relatively high, the cone of depression between the recovery and observation wells is relatively flat. Despite this condition, and the fact that pumping rates at the PTF wells were relatively low (approximately 51 gallons per minute [gpm] per well over approximately 640 feet of screen in each injection well), Florence Copper was able to successfully maintain the required 1-foot differential throughout PTF operations through real-time monitoring and active management of pumping rates.

Daily monitoring of the extracted fluid volume to injected fluid volume ratio at the PTF wellfield is required as part of the BADCT monitoring detailed in Table 4.1-8 of the Temporary APP and Part II.E.1.a of the UIC permit. The ratio of extracted volume to injected volume is required to be 110 percent or

greater. The purpose of the monitoring is to demonstrate that operational conditions are consistent with establishment and maintenance of an inward hydraulic gradient at the PTF.

The daily total volume of injected and recovered solutions is shown on Figure 10. Figure 10 shows the daily volume of recovered solution has exceeded the injected solution by between 110 and 253 percent. The recovery rate fell to 108 percent on one day (February 15, 2019), and was promptly corrected the following day when the daily recovery rate returned to 111 percent of the injection rate.

The one-day drop of the hydraulic control pumping ratio to 108 percent did not affect hydraulic control at the PTF wellfield. Groundwater modeling analysis of PTF performance indicates that hydraulic control may be maintained at a pumping ratio of 106 percent over the injected volume as requested in the applications for APP and UIC permits to authorize commercial ISCR operations.

Florence Copper has maintained compliance with the monthly average maximum injection and extraction thresholds since the commencement of PTF operations, with the exception of the monthly average injection rate for September 2019, which was 244.1 gpm. This injection rate and the associated recovery rate remained within the capacity of the PTF infrastructure and hydraulic control was maintained. The monthly average injection rate returned to below the 240 gpm limit in October 2019 and has been maintained below 240 gpm since that time.

The daily injected and recovered solution volumes plotted on Figure 10 shows that more solution was recovered from the formation than was injected. The net extraction created by these conditions established an inward hydraulic gradient and inward groundwater flow as required by the Temporary APP and UIC permit.

Please contact me at 520-316-3710 if you require any additional information.

Sincerely,
Florence Copper Inc.



Brent Berg
General Manager

cc: Maribeth Greenslade, Arizona Department of Environmental Quality

Enclosures

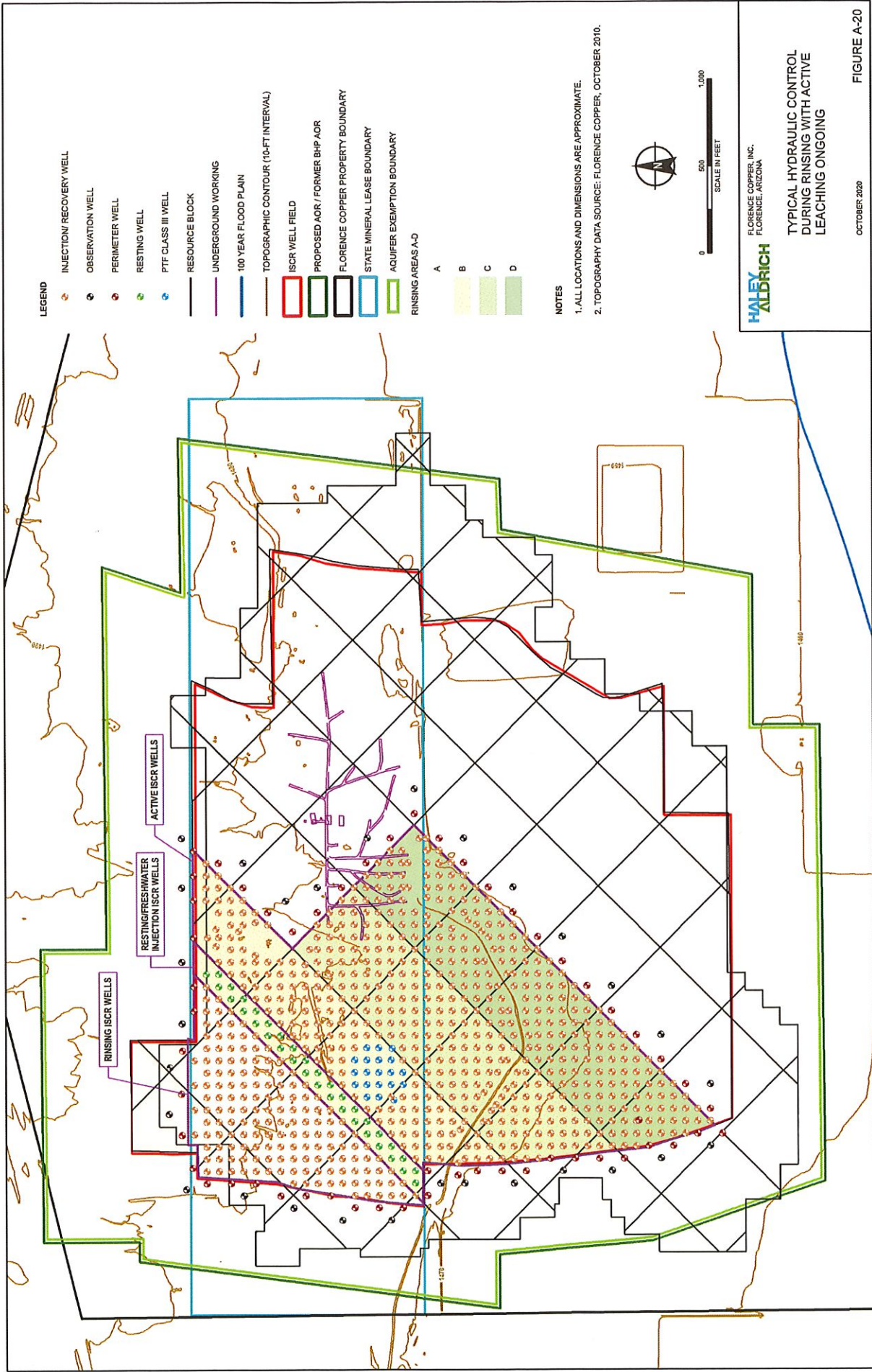


Figure 1. Groundwater Elevations
R-01, O-01, and O-07
December 2018 - March 2020

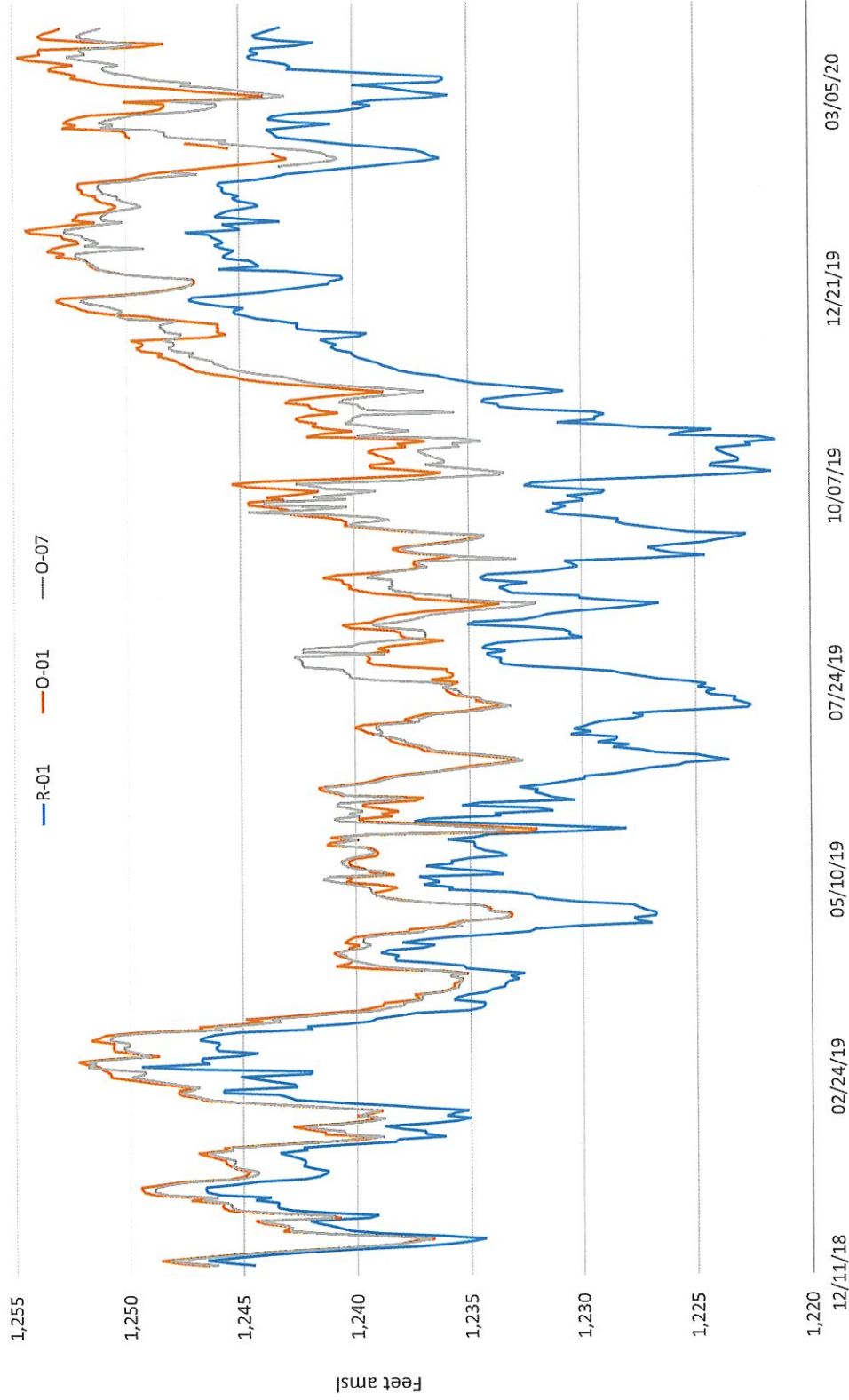


Figure 2. Groundwater Elevations

R-02, O-01, and O-02

December 2018 - March 2020

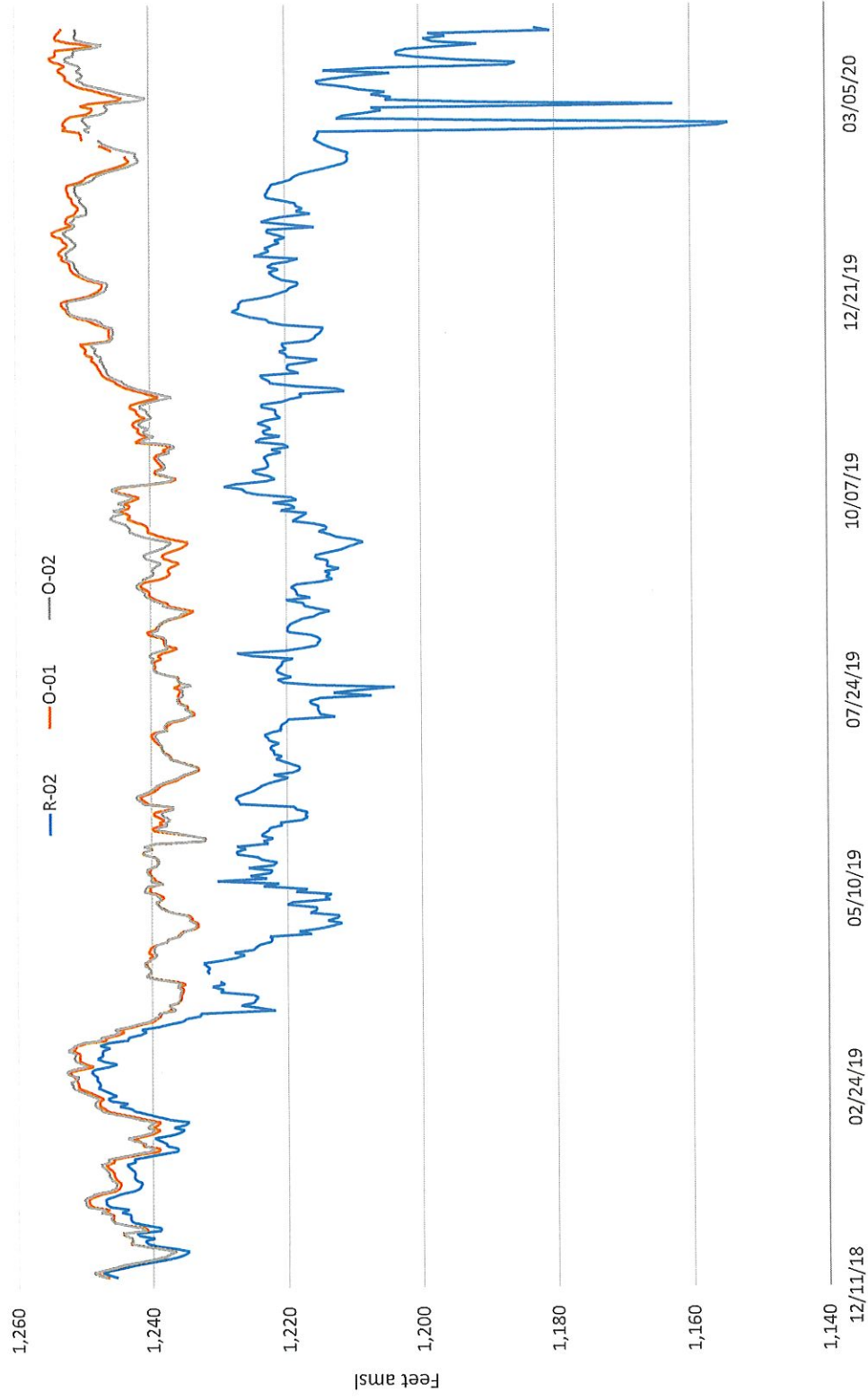


Figure 3. Groundwater Elevations

R-03, O-02, and O-03

December 2018 - March 2020

— R-03 — O-02 — O-03

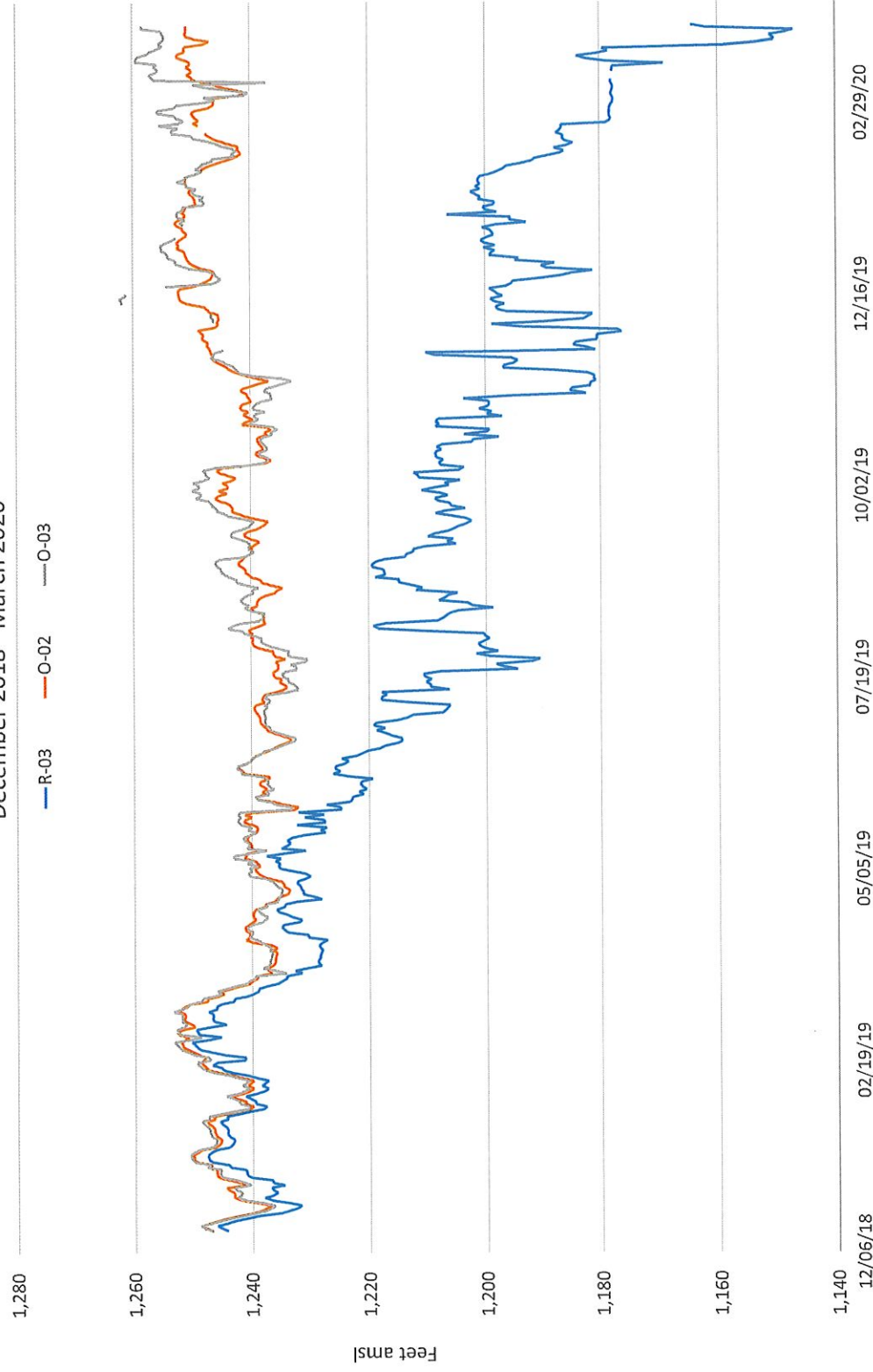


Figure 4. Groundwater Elevations

R-04 and O-03

December 2018 - March 2020

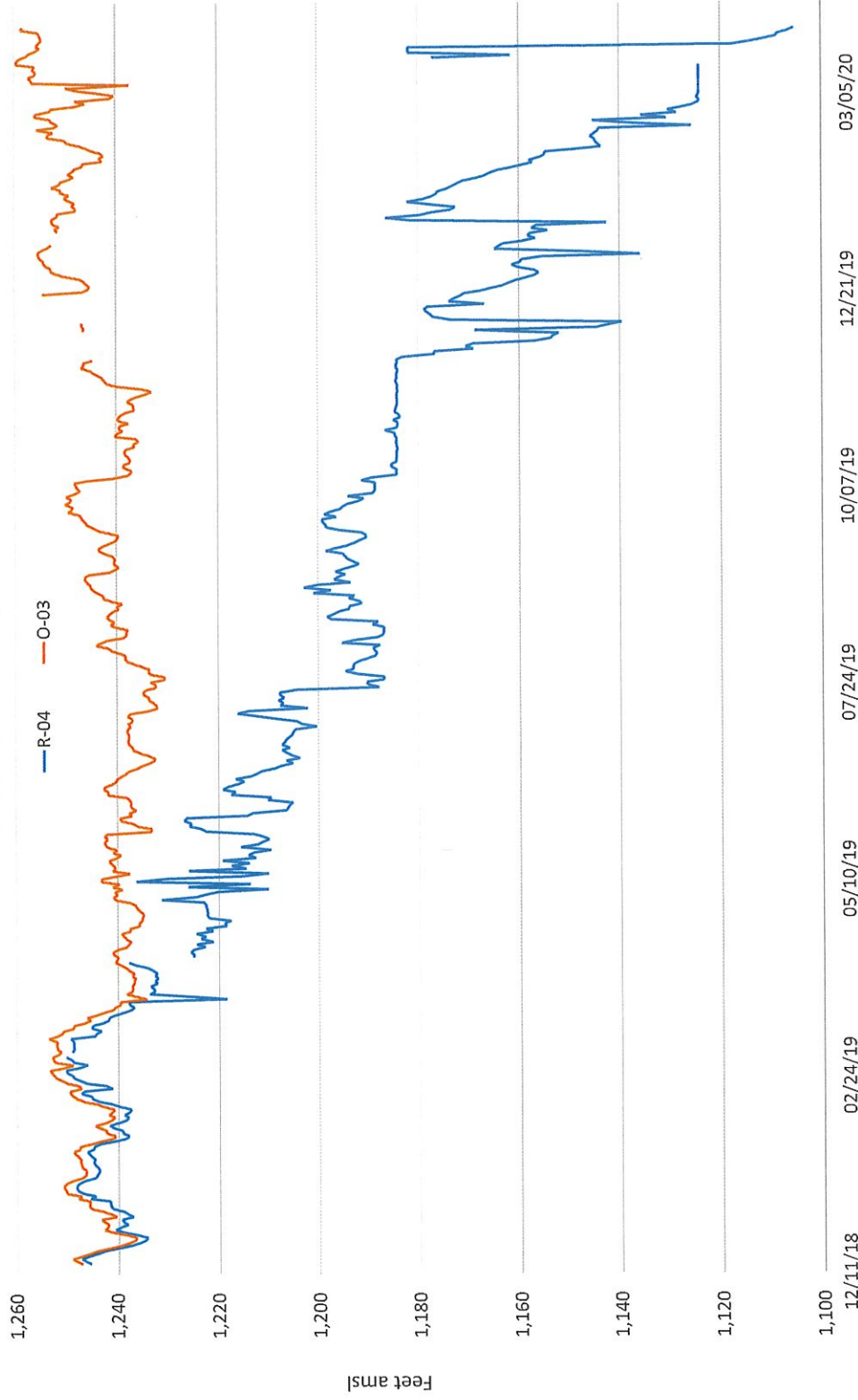


Figure 5. Groundwater Elevations
R-05 and O-04
December 2018 - March 2020

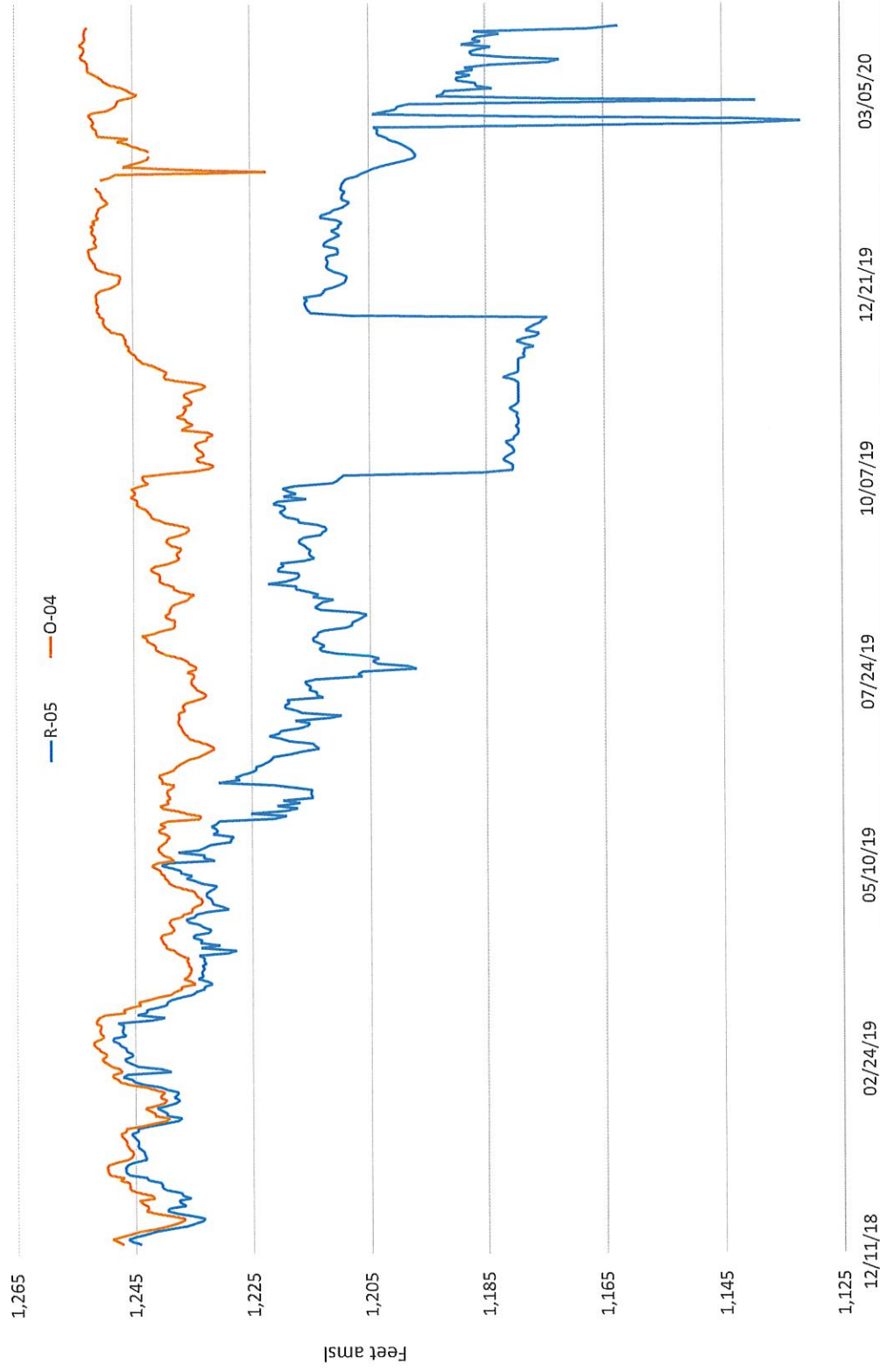


Figure 6. Groundwater Elevations

R-06, O-04, and O-05

December 2018 - March 2020

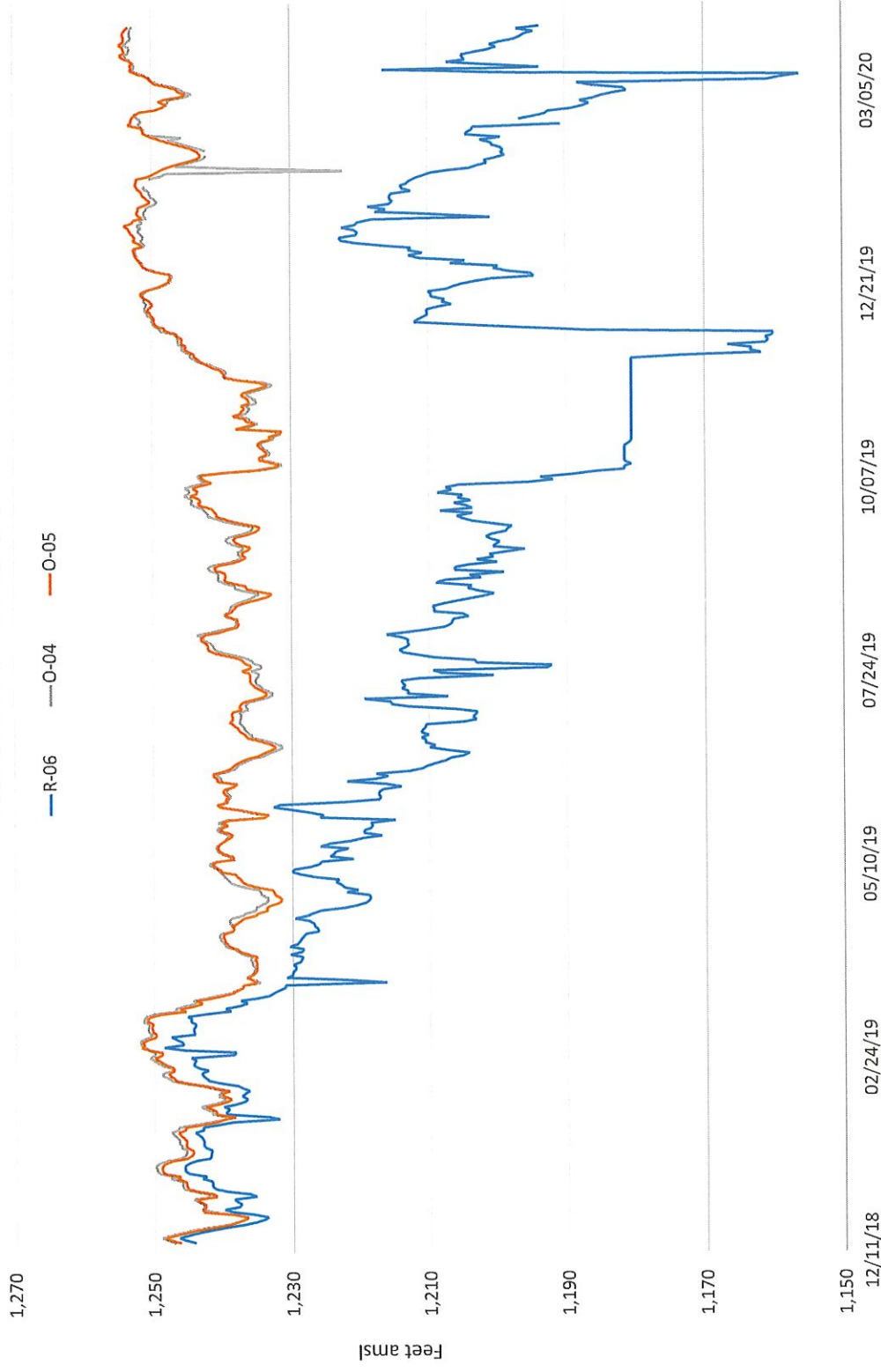


Figure 7. Groundwater Elevations

R-07, O-05, and O-06

December 2018 - March 2020

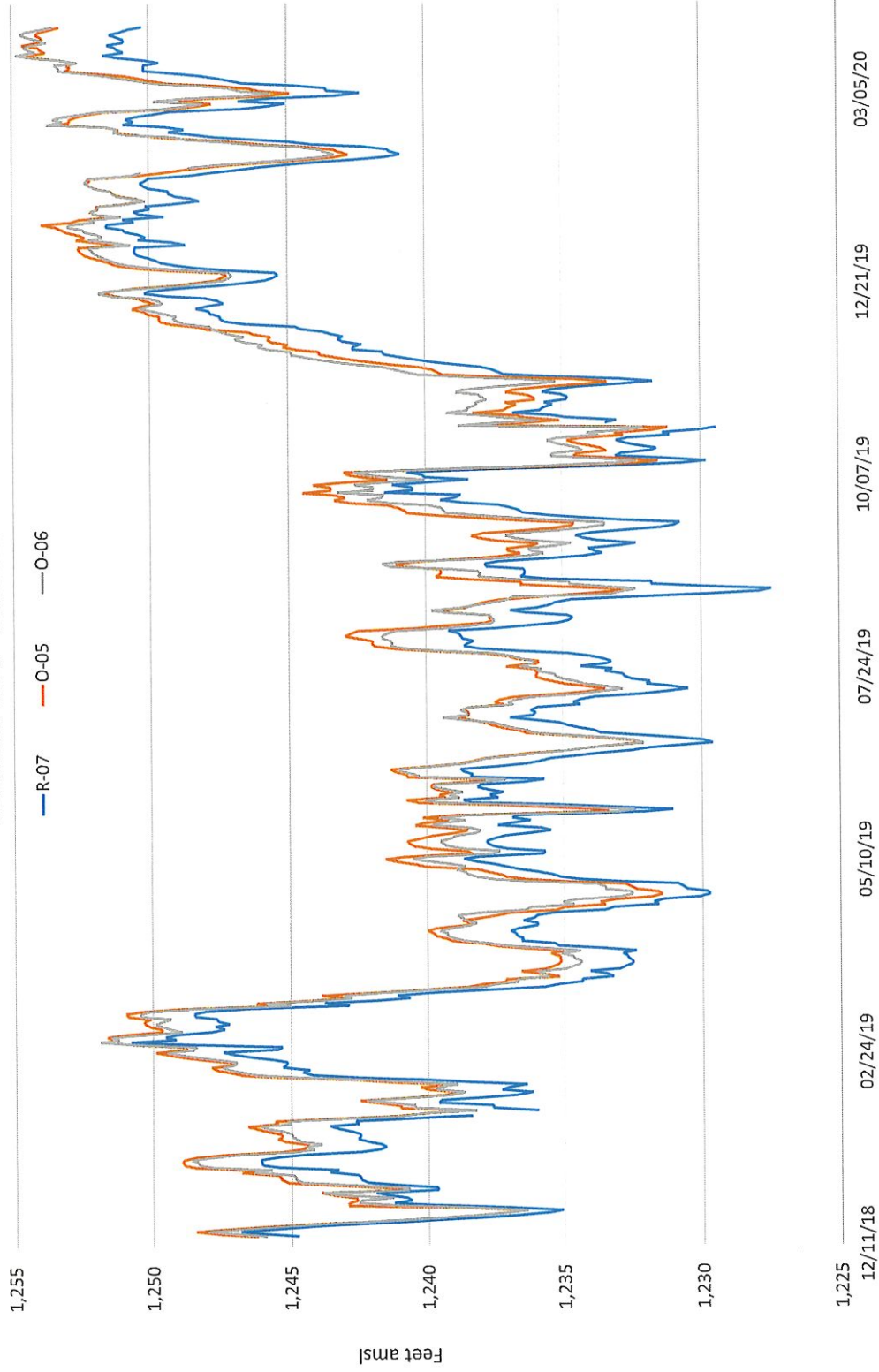
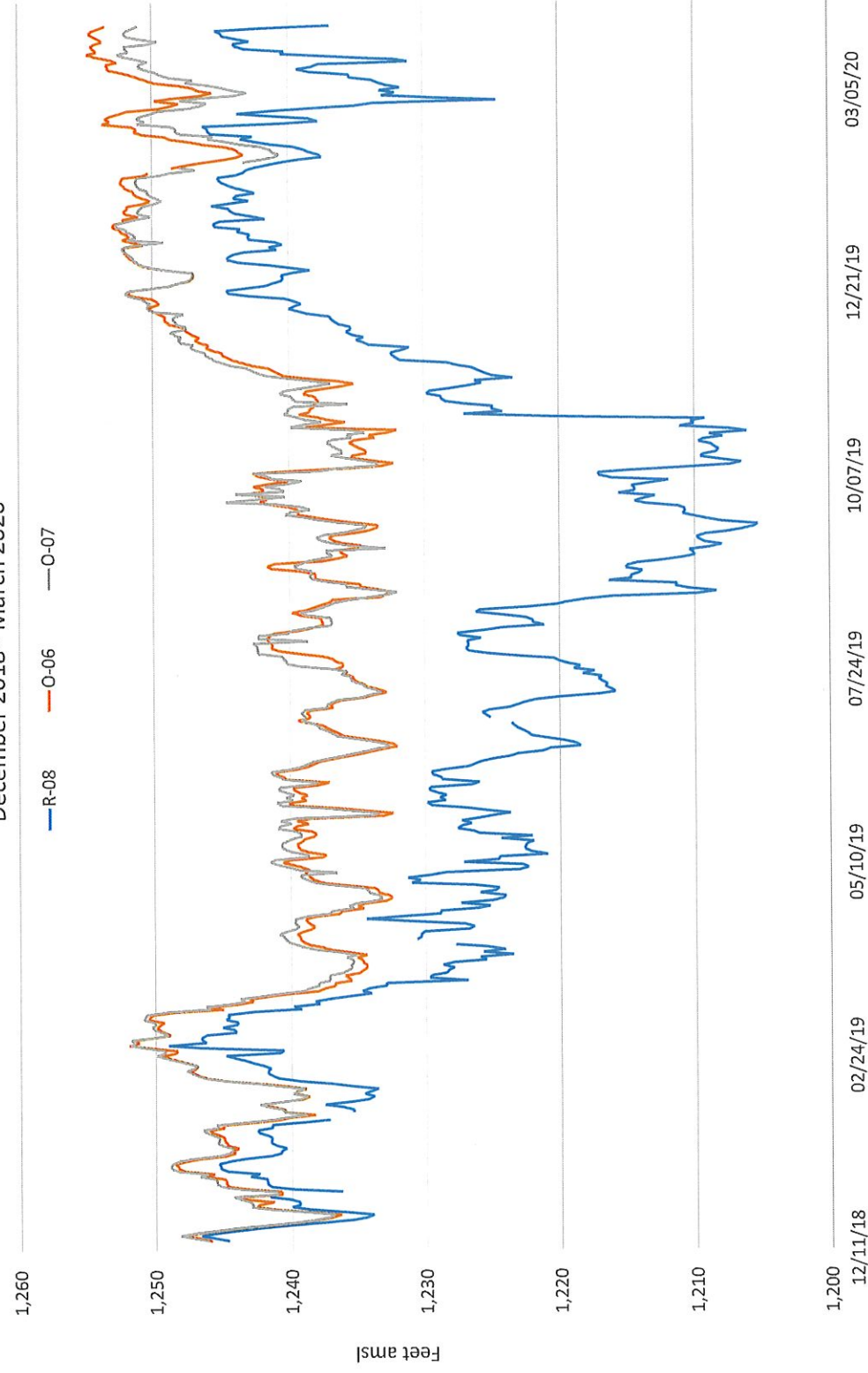
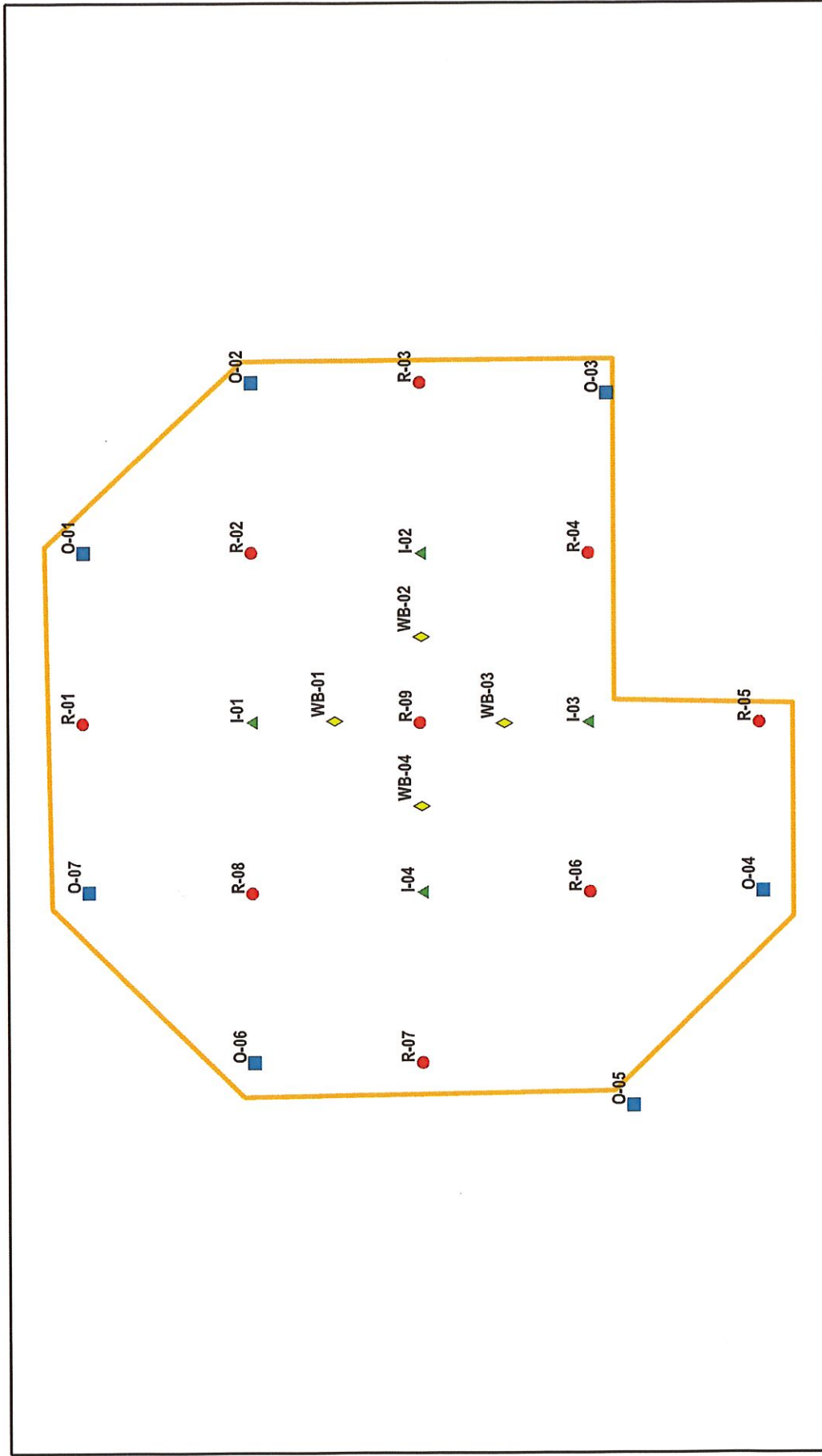


Figure 8. Groundwater Elevations
R-08, O-06, and O-07
December 2018 - March 2020



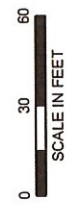


LEGEND

- ▲ INJECTION WELL
- OBSERVATION WELL
- RECOVERY WELL
- ◆ WESTBAY WELL
- ▭ PTF WELLFIELD

NOTES

1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE



HALEY ALDRICH
FLORENCE COPPER INC.
FLORENCE ARIZONA

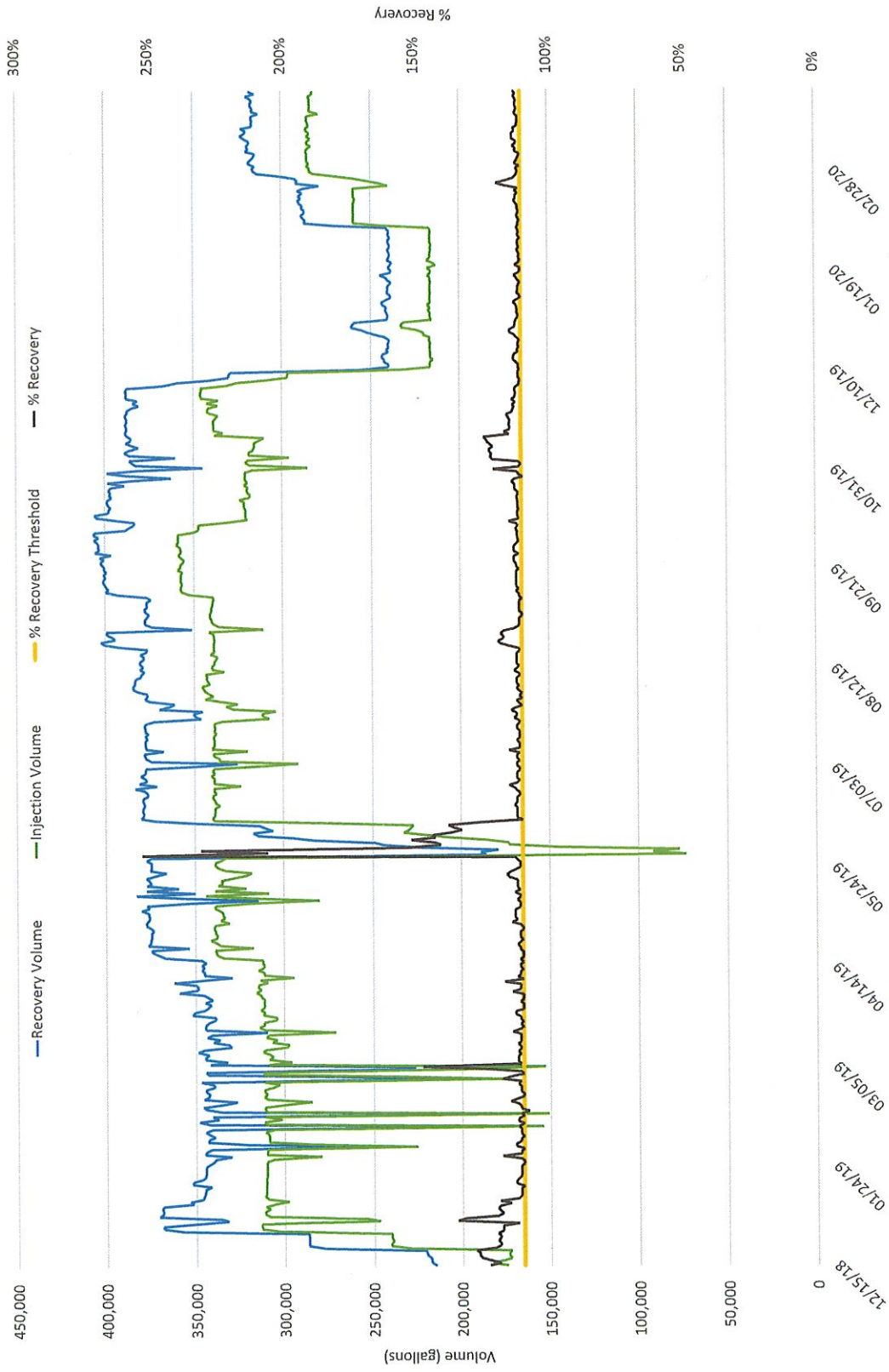
**PTF WELLFIELD
WELL CONFIGURATION**



OCTOBER 2020

FIGURE 9

Figure 10. Injection vs. Recovery Volumes
December 2018 - March 2020



**EXHIBIT D-7: DISCHARGE LIMITATIONS,
MONITORING REQUIREMENTS, AND ALERT LEVELS**
(Revised October 8, 2020)

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1.1 Introduction

Florence Copper Inc. (Florence Copper) has prepared this document to provide information regarding proposed alert levels (AL), discharge limitations, monitoring requirements, compliance schedules, and temporary cessation or related plans. Accordingly, this document includes information that describes the ALs, discharge limitations, monitoring requirements, compliance schedules, and temporary cessation plans proposed by Florence Copper.

1.2 Discharge Limitations

Florence Copper proposes the following discharge limitations:

1. The permittee shall operate and maintain all permitted facilities to prevent unauthorized discharges pursuant to Arizona Revised Statutes § 49-201(12) resulting from failure or bypassing of Best Available Demonstrated Control Technology pollutant control technologies including liner failure, uncontrollable leakage, berm breaches that result in an unexpected loss of fluid, accidental spills, or other unauthorized discharges. Liner failure in a single-lined impoundment is any condition that would result in leakage exceeding 550 gallons per day per acre of the impoundment.
2. Injection of lixiviant will not be conducted until all core holes and wells within 500 feet of an injection or recovery well located in the In-Situ Copper Recovery wellfield have been abandoned in accordance with the Plugging and Abandonment Plan included as Attachment E of the Underground Injection Control (UIC) Permit application.
3. Florence Copper will initiate contingency actions identified in Aquifer Protection Permit (APP) No. P-101704 if process solution sampling data show that the polynuclear aromatic hydrocarbon concentration in the lixiviant exceeds 20 milligrams per liter (mg/L) in any monthly sample, or 10 mg/L as a quarterly average.

1.3 Monitoring Activities

This section describes monitoring activities that are designed to provide an early detection and prompt response to any condition that might result in an unauthorized discharge to an aquifer or to the vadose zone, or that might cause a violation of an Aquifer Water Quality Standard (AWQS) at a Point of Compliance (POC), or cause concentrations of discharge constituents to increase at a POC if the pre-operational concentrations of those constituents exceed AWQS. The activities include groundwater and facility/operational monitoring.

1.3.1 Monitoring and Analytical Requirements

All monitoring required under the UIC Permit will continue for the duration of the permit except as conducted in accordance with a temporary cessation plan approved by the U.S. Environmental Protection Agency (USEPA) and the Arizona Department of Environmental Quality (ADEQ). All sampling, preservation, and holding times will be in accordance with currently accepted standards of professional practice. Trip blanks, equipment blanks, and duplicate samples will also be obtained and chain-of-custody procedures will be followed, in accordance with currently accepted standards of professional practice. Florence Copper will consult with the USEPA Code of Federal Regulations for guidance in this regard. Copies of laboratory analyses and chain-of-custody forms will be maintained at the permitted facility. Upon request, these documents will be made immediately available for review by the USEPA and ADEQ personnel.

All samples collected for compliance monitoring at the POC wells will be analyzed using Arizona and USEPA approved methods. Regardless of the method used, the detection limits will be sufficient to determine compliance with the regulatory limits of the parameters specified in the UIC Permit. Analyses will be performed by a laboratory licensed by the Arizona Department of Health Services, Office of Laboratory Licensure and Certification. For results to be considered valid, all analytical work will meet quality control standards specified in the approved methods. A list of Arizona state-certified laboratories can be obtained at the address below:

Arizona Department of Health Services
Office of Laboratory Licensure and Certification
150 North 18 Avenue
Phoenix, AZ 85007
Phone: (602) 542-1025

Monitoring equipment required by this permit will be installed and maintained so that representative samples required by the permit can be collected. If new groundwater wells are determined to be necessary, the construction details will be submitted to the USEPA and ADEQ for approval prior to installation, and the APP and the UIC Permit shall be amended to include any new monitoring points.

1.3.2 Groundwater Monitoring Sampling Protocols

The following describes the protocols that will be used for the collection and analysis of groundwater samples collected from the designated POC wells listed in Tables 13 and 14 of APP No. P-101704. The protocols will be used for collecting and analyzing samples from POC wells for which ALs and Aquifer Quality Limits (AQL) have been established, and for collecting and analyzing groundwater samples for the purpose of developing groundwater quality data needed for the establishment of ALs and AQLs. ALs and/or AQLs have been previously established for all of the POC wells listed in Tables 13 and 14 of APP No. P-101704, except replacement well M33-UBF.

Static water levels will be measured and recorded prior to sampling. Wells will be purged of at least three borehole volumes (as calculated using the static water level) or until field parameters (pH, temperature, and conductivity) are stable, whichever represents the greater volume. If evacuation results in the well going dry, the well will be allowed to recover to 80 percent of the original borehole volume, or for 24 hours, whichever is shorter, prior to sampling. If after 24 hours there is not sufficient water for sampling, the well will be recorded as "dry" for the monitoring event. An explanation for reduced pumping volumes, a record of the volume pumped, and modified sampling procedures will be reported and submitted with the quarterly report.

Florence Copper may conduct the sampling using the low-flow purging method as described in the Arizona Department of Water Resources Research Center, March 1995 Field Manual for Water Quality Sampling. If the low flow sampling method is used, the well will be purged until indicator parameters stabilize. Indicator parameters will include dissolved oxygen, turbidity, pH, temperature, and conductivity.

1.3.3 Existing ALs and AQLs

Tables 13 and 14 of APP No. P-101704 list parameters that are to be monitored quarterly and annually at each POC well during the period of the permit. ALs and/or AQLs have been previously established for all of the POC wells listed in Tables 13 and 14 of APP No. P-101704, except replacement well M33-UBF. Florence Copper will use the procedure set forth in APP No. P-101704 to calculate the ALs and/or AQLs for POC well M33-UBF.

The ALs and AQLs will be established and calculated using the method described below.

1.3.4 New ALs and AQLs

The ALs and AQLs will be established and calculated using the method set forth in APP No. P-101704 and described below.

1.3.4.1 New ALs

ALs shall be calculated for all contaminants with an established numeric AWQS for any new or replacement POC wells, unless otherwise specified in this permit.

The permittee shall submit the ambient groundwater data in tabulated form to the ADEQ for review. Copies of all laboratory analytical reports, field notes, and the Quality Assurance/Quality Control (QA/QC) procedures used in collection and analyses of the samples for all parameters listed in Table 13 of APP No. P-101704: *Quarterly Groundwater Compliance Monitoring* and Table 14 of APP No. P-101704: *Annual Groundwater Monitoring* to be established for each POC well, shall be submitted to the ADEQ. The permittee may submit a report with the calculations for each AL and AQL included in the permit for review and approval by the ADEQ, or the permittee may defer calculation of the ALs and AQLs by the ADEQ. The ALs shall be established and calculated following acceptable statistical guidance such as the *USEPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance* (EPA 530-R-09-007).

The following criteria shall be met in establishing ALs in the permit:

1. The AL shall be calculated for a parameter using the analyses from a minimum of eight sampling events.
2. Any data where the laboratory Practical Quantitation Limit (PQL) exceeds 80 percent of the AWQS shall not be included in the AL calculation.
3. If a parameter is below the detection limit, the permittee must report the value as "less than" the numeric value for the PQL or detection limit for the parameter, not just as "non-detect." For those parameters, the permittee shall use a value of one-half the reported detection limit for the AL calculation.
4. If the analytical results from more than 50 percent of the samples for a specific parameter are non-detect, then the AL shall be set at 80 percent of the AWQS.
5. If the calculated AL for a specific constituent and well is less than 80 percent of the AWQS, the AL shall be set at 80 percent of the AWQS for that constituent in that well.

1.3.4.2 New AQLs

For each of the monitored analytes for which a numeric AWQS has been adopted, the AQL shall be established as follows:

1. If the calculated AL is less than the AWQS, then the AQL shall be set equal to the AWQS.
2. If the calculated AL is greater than the AWQS, then the AQL shall be set equal to the calculated AL value, and no AL shall be set for that constituent at that monitoring point.

1.3.5 Replacement POC Wells

In the event that one or more of the designated POC wells should become unusable or inaccessible due to damage or any other event, a replacement well will be constructed and installed upon approval by the USEPA and ADEQ. If the replacement well is 50 feet or less from the original well, the ALs and/or AQLs calculated for the designated POC well will apply to the replacement well.

1.3.6 Compliance Monitoring

Florence Copper will begin compliance monitoring at the designated POC wells once applicable ALs and/or AQLs have been established. Florence Copper will continue to monitor each well listed in Tables 13 and 14 of APP No. P-101704 in accordance with the parameters and frequencies listed in those Tables. If monitoring indicates that an AL or AQL have been exceeded, Florence Copper will follow the requirements outlined in Section 2.6.2.5 of APP No. P-101704, and applicable sections of the UIC Permit. The results of compliance monitoring will be documented and submitted with the quarterly report to the USEPA and ADEQ.

1.3.7 Facility/Operational Monitoring

1.3.7.1 Facility Monitoring

Exhibit D-2 of Attachment D (Operations Plan) of the UIC Application, lists facility components that will be monitored to maintain normal operations. Many of the components listed will be equipped with electronic monitors and automatic shutoffs. Conditions requiring initiation of the contingency plan are described in Exhibit D-2 of Attachment D of this Application.

1.4 Temporary Cessation

Florence Copper will give written notice to the USEPA and ADEQ before ceasing operation of the facility for a period of 60 days or greater. At the time of notification, Florence Copper will submit for USEPA and ADEQ approval a plan for maintenance of discharge control systems and for monitoring during the period of temporary cessation. Immediately following USEPA and ADEQ approval, Florence Copper will implement the approved plan. If necessary, the USEPA and ADEQ will amend APP and UIC Permit conditions to incorporate conditions to address temporary cessation. During the period of temporary cessation, Florence Copper will provide written notice to the USEPA and ADEQ of the operational status of the facility every 2 years. If Florence Copper intends to permanently cease operation of any facility, Florence Copper will submit written notification of closure to USEPA and ADEQ in accordance with permit conditions.